AYK REGION
Herring Report #19

Observations on the Biology of the Intertidal Alga, Fucus, in Norton Sound

A Report for the Alaska Department of Fish and Game

Michael S. Stekoll

School of Fisheries and Science
University of Alaska, Juneau

August 27, 1983

INTRODUCTION

At the request of the Alaska Department of Fish and Game I visited a field camp in Norton Sound on June 6, 1983 to examine the local Fucus population in the intertidal areas. There exists a small scale fishery on the roe-on-Fucus in this area. It was thought that my experience in Bristol Bay would be helpful in suggesting management strategies for this fishery at Norton Sound.

OBSERVATIONS

The ADF&G field camp consisted of two wall tents and a large Whaler on the shore of Klikitarik Bay about 10-12 miles Northeast of St. Michaels. The only access to the camp is via boat from either St. Michaels or Unalakleet. There is a good beach next to the camp on which a small plane could land, but apparently no such planes are available for hire in this area. The camp, therefore, is relatively remote and unaccessible. This remoteness will be a major obstacle in planning any year-round research.

The geology of the area is apparently of volcanic origin with old lava flows that terminate at the water's edge. The intertidal is composed of large boulders, many of which appear to be ice-scoured. The slope of the intertidal is very steep from the upper to the lower water marks. There are deep, narrow crevasses between boulders in which the Fucus plants grow abundantly. The width of the intertidal in most areas is relatively small, only two to four meters. The tidal range is four to six feet with essentially only one high and low tide per lunar day. The low tide lasts several hours in June and occurs in the middle of the night. The Fucus zone is narrow, extending from the low water to nearly the level of the high water mark.

I visited several sites along the coast including the island near St. Michaels, Five Mile Point, a few areas near Klikitarik, an island near Black Point, and Black Point itself. Some of these areas had been recently harvested. Others had been unpicked for two or more years.

Fucus appears to be the sole perennial intertidal alga in this area. In the upper intertidal it exists as a very small, thin plant of only five to seven centimeters in length. I did not observe any fertile plants in this zone. Nor were many Fucus germlings visible. In the mid to the low intertidal the plants were significantly larger both in the width of the fronds and in the length of the plants. In harvested areas the plants appeared mainly in the crevasses between rocks with the tops of the rocks bare. In unharvested areas there were many more plants on the tops of the rocks. In some areas mature plants were found, but in general it appeared the majority of the plants were not yet mature. However, there existed several hundred very small plants both under the canopy and on tops of the otherwise bare rocks. These plants appeared to be very young (less than one month). I was told that the ice had still been in the intertidal up to two weeks prior to my visit. It is not clear whether there was ample time for the germlings to grow after the ice left, or whether these small plants were able to exist and perhaps grow under the ice during the winter. It is difficult to imagine how the new plants could have been started this season since very few mature plants were around.

Some areas such as the islands south of Black Point had patches of very healthy, large mature Fucus similar to the plants in the good areas of Bristol Bay. Here again were found areas which were being repopulated by hundreds of tiny Fucus plants of indeterminate age.

The Fucus in Norton Sound appears to have no serious competitors in the intertidal. Annuals such as Ulva and Enteromorpha were the only other intertidal algae found. An occassional Rhodomela was found in the upper subtidal along with an unidentified, small, bleached red alga. I would estimate that perrenials other than Fucus comprise less than one per cent of the algal biomass.

The only potential predator of Fucus found in the intertidal was a large snail which has been identified as Littorina planaxis, although the snail exceeds both the size and the range from the literature (Shirley, personal communication). These snails normally feed on diatoms and small plants growing on the rocks. It is probable these snails could be a significant source of predation on the Fucus germlings. However, these snails were not common at all of the sites, and, hence, their role in Fucus settlement and growth needs to be clarified.

The overall impression one receives at Norton Sound is that this area represents the limits to survival for most intertidal species. The lack of diversity is striking, and leads one to the conclusion that improper management of a species could easily eliminate it. In spite of this impression, the Fucus plants themselves seem to be doing moderatley well. It would seem appropriate as an interim management strategy to allow harvests of an area once every two or three years. This suggestion is based on the facts that in Norton Sound, 1) the large plants in the crevasses are left unpicked, 2) there appear to be many new germlings growing on the rocks subsequent to a harvest, and 3) there are very few competitors and/or predators that would affect Fucus regrowth. On the other hand the ADF&G staff pointed out areas that were harvested two to three years ago that still had not recovered to any significant extent.

These observations lead me to suspect that the growth rates of Fucus in Norton Sound may be slow compared to those in Bristol Bay. Hence, repopulation of denuded areas may take longer. The Fucus in Norton Sound may not, therefore, be able to withstand a very large fishing pressure.

It appears, also, that the Fucus may be the only significant vegetation upon which the herring spawn. From personal observation, from drift seaweed analysis, and from information from the local ADF&G staff, I conclude that there is very little, if any, subtidal algae of any kind in nearshore Norton Sound. There apparently are eel grass beds north of Unalakleet, but none in the area of the roe-on-Fucus fishery. It is obvious that the herring spawn on Fucus in Norton Sound with the spawn being up to ten layers thick. However, the herring also spawn extensively on the rocks. With the unusual tides and lack of predators there may be significant survival of such spawn.

RECOMMENDATIONS

Since the immediate need appeared to be to assess the growth rates of the Fucus plants, we (the ADF&G staff at the field camp and myself) devised some simple methods for obtaining preliminary data. However, any methods for measuring growth rates requires repeated visits to the study sites. Such sites should be easily accessible in all kinds of weather and sea conditions. One of the staff at the field camp indicated he would begin a growth study in June and revisit the sites in September. If this is done, a reasonable estimate for seasonal growth rates may be obtained.

CONCLUSIONS

The Norton Sound environment is different eonugh from Bristol Bay to preclude a direct transfer of management strategies for the roe-on-

Fucus fishery. Norton Sound has a more severe winter, a steeper intertidal, less species diversity, and less extreme tides than exist in Bristol Bay. I suggest a two year study be performed on the growth and recolonization rates of the Fucus in Norton Sound. Special attention should be given to the timing of reproductivity of the plants and to the effects of the winter. I shall prepare a proposal for this purpose in the near future.

I suggest that the current management strategy be to close areas that have been heavily harvested until the Fucus has recovered to its former levels. It would be advisable to maintain a permanently closed area to serve as a control for comparison purposes. Recovery can be estimated by biomassing techniques using transects, by percent coverage methods using twenty-five or fifty point grids, or by using the non-destructive volume estimation technique as explained in the appendix to the 1982 Annual Report for the Kelp Regeneration Study submitted to ADF&G.